What is claimed is:

1. A circuit board inspection device for inspecting operation of a circuit board having a predetermined part or wire formed therein, comprising:

a supporting substrate disposed substantially in parallel with a parts mounting surface of the circuit board; and

a signal change detection unit disposed in a position of the supporting substrate corresponding to the part or wire of the circuit board, with the supporting substrate being disposed substantially in parallel with the circuit board.

2. The circuit board inspection device according to Claim 1, wherein the signal change detection unit includes a coil for generating an induction voltage in accordance with a magnetic field generated from a current flowing through the part.

3. The circuit board inspection device according to Claim 1, wherein the signal change detection unit includes an impedance component for generating electrical potential information in accordance with a change of a signal flowing through the wire.

4. The circuit board inspection device according to Claim 1, wherein the supporting substrate is made of a thin substrate having flexibility.

5. The circuit board inspection device according to Claim 1, wherein the supporting substrate has substantially the same dimensions as the circuit board.

6. The circuit board inspection device according to Claim

1, wherein a hole for avoiding the supporting substrate to come into contact with the predetermined part of the circuit board is formed in a position of the supporting substrate corresponding to the part, with the supporting substrate being disposed substantially in parallel with the circuit board.

7. The circuit board inspection device according to Claim 1, wherein the supporting substrate is provided to be assemblable into a box, and the supporting substrate assembled into a box is disposed substantially in parallel with the circuit board.

8. The circuit board inspection device according to Claim 2, wherein the coil is wound around the supporting substrate correspondingly to an outer circumference of the circuit board.

9. The circuit board inspection device according to Claim 2, wherein the coil is wound around the supporting substrate correspondingly to an outer circumference of the part.

10. The circuit board inspection device according to Claim 2, wherein the coil is wound around the supporting substrate correspondingly to a position of a terminal of the part.

11. The circuit board inspection device according to Claim 2, wherein the coil is wound around the supporting substrate correspondingly to a position of an input/output connector of the circuit board.

12. The circuit board inspection device according to Claim 2, wherein there are a plurality of the circuit boards, and the coil is wound around the supporting substrate correspondingly

to a position of a cable connecting the circuit boards.

13. The circuit board inspection device according to Claim 2, wherein the coil is wound around the supporting substrate correspondingly to an outer circumference of a circuit board group in which a plurality of the circuit boards are connected.

14. The circuit board inspection device according to Claim 3, wherein the impedance component is made of a capacitive component.

15. The circuit board inspection device according to Claim 3, wherein the impedance component is made of an inductive component.

16. The circuit board inspection device according to Claim 3, wherein the impedance component is made of a resistive component.

17. The circuit board inspection device according to Claim 3, wherein the impedance component is disposed on the supporting substrate so as to substantially cross a direction of the wire of the circuit board at right angles.

18. The circuit board inspection device according to Claim 1, wherein the signal change detection unit is disposed astride a plurality of layers of the support substrate.

19. The circuit board inspection device according to Claim 2, wherein the coil is formed with an equal number of turns for each of a plurality of layers of the supporting substrate.

20. The circuit board inspection device according to Claim

14, wherein the capacitive component is made of electrodes provided in two of a plurality of layers of the supporting substrate.

21. The circuit board inspection device according to Claim 1, wherein a plurality of the signal change detection units are provided, and one-side terminals of the signal change detection units are connected in common.

22. The circuit board inspection device according to Claim 21, wherein a common terminal in which the one-side terminals of the signal change detection units are connected in common is grounded outside the supporting substrate.

23. The circuit board inspection device according to Claim 21, wherein the one-side terminals of the signal change detection units are connected in common in an end portion of the supporting substrate.

24. The circuit board inspection device according to Claim 1, wherein a plurality of the signal change detection units are provided, and terminals of the signal change detection units are led into the supporting substrate closely to one another and substantially in parallel with one another.

25. The circuit board inspection device according to Claim 1, wherein the supporting substrate comprises a front-side supporting substrate disposed on a front side of the circuit board, and a back-side supporting substrate disposed on a back side of the circuit board;

the front-side supporting substrate is provided with the signal change detection unit in a position corresponding to a part or a wire mounted on the front side of the circuit board; and

the back-side supporting substrate is provided with the signal change detection unit in a position corresponding to a part or a wire mounted on the back side of the circuit board.

26. The circuit board inspection device according to Claim 1, wherein the supporting substrate comprises a front-side supporting substrate disposed on a front side of the circuit board, and a back-side supporting substrate disposed on a back side of the circuit board; and

the signal change detection unit is formed astride both the front-side supporting substrate and the back-side supporting substrate.

27. The circuit board inspection device according to Claim 1, wherein the supporting substrate comprises a front-side supporting substrate disposed on a front side of the circuit board, and a back-side supporting substrate disposed on a back side of the circuit board; and

the front-side supporting substrate and the back-side supporting substrate are formed integrally.

28. The circuit board inspection device according to Claim 26, wherein the signal detection unit is provided only one of the front-side supporting substrate and the back-side supporting

substrate correspondingly to a side of the circuit board on which the part or wire to be inspected is disposed.

29. The circuit board inspection device according to Claim 27, wherein the signal detection unit is provided only one of the front-side supporting substrate and the back-side supporting substrate correspondingly to a side of the circuit board on which the part or wire to be inspected is disposed.

30. The circuit board inspection device according to Claim 1, further comprising:

a signal check portion for comparing a signal detected by the signal change detection unit with a normal signal stored in advance; and

a diagnosis portion for performing diagnosis as to whether the portion to be inspected operates normally or not, based on a comparison result of the signal check portion.

31. The circuit board inspection device according to Claim 30, wherein the signal check portion and/or the diagnosis portion are provided on the supporting substrate.

32. The circuit board inspection device according to Claim 30, wherein the signal check portion and the diagnosis portion are provided outside the supporting substrate.

33. A failure diagnosis method for diagnosing existence of a failure in a portion to be diagnosed, such as wiring of a circuit board or a part mounted on the circuit board, comprising the steps of:

reading an induction voltage generated in a magnetic field sensing portion when a magnetic flux generated from a current flowing through the portion to be diagnosed is passed through a winding wire of a spiral coil functioning as the magnetic field sensing portion; and

comparing the read induction voltage with a normal induction voltage measured in advance, to thereby diagnose existence of a failure in the portion to be diagnosed;

wherein the spiral coil as the magnetic field sensing portion is placed so as to be opposed to the portion to be diagnosed, to have a magnetic path length substantially equal to or smaller than a width of the portion to be diagnosed, and to be disposed perpendicularly and fixedly to a direction of the current flowing through the portion to be diagnosed.

34. A failure diagnosis system for diagnosing existence of a failure in a portion to be diagnosed, such as wiring of a circuit board or a part mounted on the circuit board, comprising:

a spiral coil functioning as a magnetic field sensing portion, opposed to the portion to be diagnosed, having a magnetic path length substantially equal to or smaller than a width of the portion to be diagnosed, and disposed perpendicularly and fixedly to a direction of a current flowing through the portion to be diagnosed; and

a failure diagnosis portion for diagnosing existence of a failure in the portion to be diagnosed by reading an induction

voltage generated in the magnetic field sensing portion when a magnetic flux generated from the current flowing through the portion to be diagnosed is passed through a winding wire of the spiral coil functioning as the magnetic field sensing portion and by comparing the read induction voltage with a normal induction voltage measured in advance.

35. The failure diagnosis system according to Claim 34, wherein the spiral coil is constituted by a plurality of conductors formed by partially cutting two opposed conductor layers formed out of printed wiring patterns on the circuit board, and through holes for vertically connecting the plurality of conductors with each other respectively; and

the magnetic path length of the spiral coil is set to be substantially equal to or smaller than a width of a predetermined wiring pattern corresponding to the portion to be diagnosed.

36. The failure diagnosis system according to Claim 35, wherein the circuit board is a multilayer board made of a laminate of a plurality of layers of boards; and

the spiral coil is formed out of printed wiring patterns of two layers of the multilayer board.

37. The failure diagnosis system according to Claim 34, wherein the spiral coil is formed on a printed wiring board different from the circuit board; and

the printed wiring board having the spiral coil formed thereon is disposed in close contact with the circuit board

so that the spiral coil and the portion to be diagnosed are opposed to each other.

38. The failure diagnosis system according to Claim 37, wherein the printed wiring board having the spiral coil formed thereon is a flexible printed circuit board.

39. The failure diagnosis system according to Claim 35, wherein an insulating magnetic substance layer is provided between the two conductor layers having the conductors forming the spiral coil.

40. The failure diagnosis system according to Claim 34, wherein the circuit board includes a cable member for forming a winding wire of the spiral coil, and a retention member for fixing a physical position of the cable member.

41. A printed wiring board for use in a failure diagnosis system for diagnosing existence of a failure in a portion to be diagnosed, such as wiring of a circuit board or a part mounted on the circuit board, comprising:

a spiral coil functioning as a magnetic field sensing portion, opposed to a portion to be diagnosed, having a magnetic path length substantially equal to or smaller than a width of the portion to be diagnosed, and further disposed perpendicularly and fixedly to a direction of a current flowing through the portion to be diagnosed.

42. The printed wiring board according to Claim 41, wherein the spiral coil is constituted by a plurality of conductors

formed by partially cutting two opposed conductor layers formed out of printed wiring patterns on a circuit board, and through holes for vertically connecting the plurality of conductors with each other respectively; and

the magnetic path length of the spiral coil is set to be substantially equal to or smaller than a width of a predetermined wiring pattern corresponding to the portion to be diagnosed.

43. The printed wiring board according to Claim 42, wherein the printed wiring board is a multilayer board made of a laminate of a plurality of layers of boards; and

the spiral coil is formed out of printed wiring patterns of two layers of the multilayer board.

44. The printed wiring board according to Claim 41, wherein the spiral coil is formed on another printed wiring board than the circuit board.

45. The printed wiring board according to Claim 44, wherein the printed wiring board having the spiral coil formed thereon is a flexible printed circuit board.

46. The printed wiring board according to Claim 41, wherein an insulating magnetic substance layer is provided between the two conductor layers having the conductors forming the spiral coil.